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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

TSOY, ELENA

ART UNIT	PAPER NUMBER
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1762

DATE MAILED: 04/28/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/895,153	NEOH ET AL.	
	Examiner	Art Unit	
	Elena Tsoy	1762	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 08 March 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-19 and 34-38 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-19 and 34-37 is/are rejected.
- 7) ☒ Claim(s) 38 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 08 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☒ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>1</u> . | 6) <input type="checkbox"/> Other: _____ |

Response to Amendment

1. Amendment filed on March 8, 2004 has been entered. Claims 23-33 have been cancelled. New claims 37 and 38 have been added. Claims 1-19, 34-38 are pending in the application.

2. The Examiner's Note: for examining purposes, "a pre-doped composition" of claim 1 was interpreted according to prior art as a composition having up to 50 % of viologen salt.

Declaration

3. The Declaration under 37 CFR 1.132 filed on March 8, 2004 is insufficient to overcome the rejection of claims 1-19, 34-37 based upon cited prior art as set forth in the last Office action because the experiment conducted by Liu actually recreated a method of claim 34 instead of recreating methods of cited references. Therefore, unsatisfactory results shown by Declaration are insufficient to overcome the rejection.

Specification

4. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required: "irradiating the pre-doped composition with electromagnetic radiation thus producing an electrically conductive polymeric material" (Claim 1) "wherein the electromagnetic radiation is one or more UV or near UV wavelengths" (Claim 2), are not in the body of the disclosure. Amendment of the disclosure to incorporate the language of originally filed claims does not raise issue of new matter. According to specification as filed, an electrically conductive polymeric material is produced by contacting the surface of the polymeric material with an aqueous solution of viologen salt under ordinary room lighting (See examples 2, 4, 6). Ordinary room lighting could be of electrical origin, not necessarily UV or near UV.

Double Patenting

5. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

6. **Claims 1-5, 19** are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 25 of copending Application No. 09/828924. Although the conflicting claims are not identical, they are not patentably distinct from each other because claim 25 of copending Application No. 09/828924 is directed to the same subject matter such as a method for preparing an electrically conductive polymeric material, comprising contacting the polymeric material with viologen salt (thereby forming a pre-doped composition) and irradiating the contacted (pre-doped) polymeric material.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art

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to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. **Claims 1, 7-11, 17** are rejected under 35 U.S.C. 103(a) as being unpatentable over Mikhael et al (US 6,040,017) in view Kato et al (US 4,875,762).

As to claims 1, 2, 17, Mikhael et al disclose a method for preparing an electrically conductive polymeric material (See column 2, lines 66-67), comprising i) contacting a polymeric material such as polyaniline (See column 3, lines 47-48) with an organic electron-acceptor dopant such as quinone (See column 3, lines 45-47) to form a pre-doped composition (See column 2, lines 9-30); and ii) irradiating the pre-doped composition with UV light (electromagnetic radiation of an appropriate wavelength) (See column 2, lines 38-39) thus producing electrically conductive polymeric material (See column 2, lines 66-67). The dopant may be **any** electrophilic *organic substance* that **interacts or complexes** with **any** electron-rich *organic donor material* (See column 3, lines 19-23). The electron-acceptor dopant is e.g., C60 fullerene, tetracyanoethylene, or tetrafluoromethanecyanoquinodimethane (quinone), the electron-donor substance is e.g., vinylcarbazole, 9,10-bis(phenylethynyl) anthracene, sudan azo dyes, or polyaniline (See column 3, lines 44-48). The electrically conductive polymeric material can be deposited repeatedly on a suitable substrate forming a multiplayer structure (See column 5, lines 49-50).

Mikhael et al fail to teach that an organic electron-acceptor is a viologen salt (Claim 1), wherein at least one of the 1,1'-substituents are independently selected from an alkyl group or a benzyl group (Claim 11), or a mixture of viologen salts (Claim 10).

Kato et al teach that alkyl viologens such as methyl viologen or benzyl viologen, which are known as organic compounds which manifest **photochromism** and **electrochromism**, (See column 2, lines 53-61) can be used with an electron donor such as polyvinyl pyrrolidone to effect photoreduction (See column 3, lines 8-13). In other words, a secondary reference of Kato et al is

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relied upon to show that alkyl viologen such as methyl viologen or benzyl viologen is capable of manifesting photochromism and electrochromism, and is suitable for the use as an electron-acceptor that interacts or complexes with electron-rich organic donor material.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used methyl viologen or benzyl viologen as an electron-acceptor that interacts or complexes with electron-rich organic donor material in Mikhael et al since Kato et al teach that alkyl viologen such as methyl viologen or benzyl viologen is capable of manifesting photochromism and electrochromism, and is suitable for the use as an electron-acceptor that interacts or complexes with electron-rich organic donor material.

It is held that the selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945). See also *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960) (selection of a known plastic to make a container of a type made of plastics prior to the invention was held to be obvious); *Ryco, Inc. v. Ag-Bag Corp.*, 857 F.2d 1418, 8 USPQ2d 1323 (Fed. Cir. 1988).

As to claim 10, it is held that it is prima facie obvious to combine two compositions each of which is taught by the prior art to be useful for the same purpose, in order to form a third composition to be used for the very same purpose.... *In re Kerkhoven*, 626 F.2d 846, 850, 205 USPQ 1069, 1072 (CCPA 1980). See also *In re Crockett*, 279 F.2d 274, 126 USPQ 186 (CCPA 1960); and *Ex parte Quadranti*, 25 USPQ2d 1071 (Bd. Pat. App. & Inter. 1992).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have combined methyl viologen and benzyl viologen in Mikhael et al in view of Kato et al since Kato et al teach that each of methyl viologen and benzyl viologen is capable of

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manifesting photochromism and electrochromism, and is suitable for the use as an electron-acceptor that interacts or complexes with electron-rich organic donor material.

9. **Claim 2** is rejected under 35 U.S.C. 103(a) as being unpatentable over Mikhael et al (US 6,040,017) in view Kato et al (US 4,875,762), further in view of IBM Technical Disclosure Bulletin (1979).

Mikhael et al in view Kato et al, as applied above, fail to teach that photochromism is affected by UV (Claim 2).

IBM Technical Disclosure Bulletin teaches that the electronic absorption of viologen is in the ultraviolet (See Disclosure).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used UV radiation in Mikhael et al in view Kato et al with the expectation of effecting the desired photochromism and electrochromism, since IBM Technical Disclosure Bulletin teaches that the electronic absorption of viologen is in the ultraviolet.

10. **Claims 1-5, 7-11, 15, 17, 18** are rejected under 35 U.S.C. 103(a) as being unpatentable over Afzali-Ardakani et al (US 5,776,370) in view of Kato et al (US 4,875,762), further in view of IBM Technical Disclosure Bulletin (1979).

As to claims 1, 8, 17, Afzali-Ardakani et al disclose a method for preparing electrically conductive polymeric material based on polyaniline with an electron acceptor for the use in printed circuit board or other devices (See column 1, lines 8-16; column 2, lines 31-43), comprising forming a charge transfer complex (CTC) of polyaniline with the electron acceptor by contacting polyaniline with an organic electron acceptor (See column 4, lines 26-33) such as quinone (See column 3, lines 61-67) by either immersing polyaniline film deposited on a substrate (See column 4, lines 26-33) into a solution of the electron acceptor in an organic solvent or water

(See column 1, lines 52-58; column 4, lines 44-52) or alternatively by simply mixing polyaniline solution with the solution of the organic electron acceptor (See column 4, lines 37-41). Afzali-Ardakani et al teach that the rate of complexation (doping) is dependent on the electron affinity (reduction potential) of the molecule as well as the polarity of the solvent (See column 4, lines 29-34).

Afzali-Ardakani et al fail to teach that an organic electron-acceptor is a viologen salt (Claims 1, 9) such as dihalide (Claim 15) or a mixture of viologen salts (Claim 10), wherein the 1,1'-substituents are independently selected from an alkyl group or a benzyl group (Claim 11); CTC is formed by depositing viologen on the polyaniline film deposited on a substrate into a solution of viologen; or alternatively by simply mixing polyaniline solution with the solution of viologen (Claim 7), then irradiating the deposited viologen for transferring electron (Claim 1) using UV radiation (Claim 2), thereby grafting viologen onto the polyaniline surface (Claim 4) in situ (Claim 5).

Kato et al teach that alkyl viologens such as methyl viologen or benzyl viologen, which are known as organic compounds which manifest **photochromism** and **electrochromism**, (See column 2, lines 53-61) can be used with an electron donor such as polyvinyl pyrrolidone to effect photoreduction (See column 3, lines 8-13). In other words, a secondary reference of Kato et al is relied upon to show that alkyl viologen such as methyl viologen or benzyl viologen is capable of manifesting photochromism and electrochromism, and is suitable for the use as an electron-acceptor that interacts or complexes with electron-rich organic donor material.

IBM Technical Disclosure Bulletin teaches that viologen absorbs electron in UV (See Disclosure).

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It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used methyl viologen or benzyl viologen as an electron-acceptor in Afzali-Ardakani et al since Kato et al teach that alkyl viologen such as methyl viologen and benzyl viologen is suitable for the use as an electron-acceptor that interacts or complexes with electron-rich organic donor material.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have irradiated methyl viologen or benzyl viologen deposited on polyaniline by immersion polyaniline film into a solution of methyl viologen or benzyl viologen or by mixing viologen solution with polyaniline solution in Afzali-Ardakani et al with UV with the expectation of providing the desired CTC, since IBM Technical Disclosure Bulletin teaches that viologen absorbs electron in UV.

As to claim 10, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have combined methyl viologen and benzyl viologen in Afzali-Ardakani et al in view of Kato et al since Kato et al teach that each of methyl viologen and benzyl viologen is capable of manifesting photochromism and electrochromism, and is suitable for the use as an electron-acceptor that interacts or complexes with electron-rich organic donor material.

As to claim 18, the polymeric material of Afzali-Ardakani et al in view of Kato et al in view of IBM Technical Disclosure Bulletin would have reduced resistance by approximately 3-6 orders of magnitude within a period of 3 hours or less since it is held that products having identical or substantially identical structure or composition, have identical or substantially identical properties.

11. **Claim 6** is rejected under 35 U.S.C. 103(a) as being unpatentable over Afzali-Ardakani et al (US 5,776,370) in view of Kato et al (US 4,875,762), further in view of IBM Technical Disclosure Bulletin (1979), and further in view of Beratan et al (US 5,016,063).

Afzali-Ardakani et al in view of Kato et al in view of IBM Technical Disclosure Bulletin, as applied above, fail to teach that viologen-bearing substrate is coated with the polymeric material.

Beratan et al teach that for some applications a charge transfer complex (CTC) comprising polyaniline electron donor and a viologen salt electron acceptor can be positioned between two substrates wherein the complex is attached to a first substrate via the viologen salt and to a second substrate via polyaniline and preferably the viologen salt electron acceptor is connected to the polyaniline electron donor via an intermediate donor for an improved charge transfer (See Fig. 4b; column 6, lines 16-30).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have positioned a CTC of Afzali-Ardakani et al in view of Kato et al in view of IBM Technical Disclosure Bulletin by attached polyaniline coated with a viologen to a suitable substrate so that CTC is attached to the substrate via viologen depending on intended use of a final product since Beratan et al teach that for some applications CTC comprising polyaniline electron donor and a viologen electron acceptor can be positioned between two substrates wherein the complex is attached to a first substrate via the viologen salt and to a second substrate via polyaniline.

12. **Claims 12-16** are rejected under 35 U.S.C. 103(a) as being unpatentable over Mikhael et al (US 6,040,017) in view Kato et al (US 4,875,762), further in view of Inata et al (US 5,068,062).

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Mikhael et al in view Kato et al, as applied above, fail to teach that viologen salt is a polymeric viologen salt (Claim 12) wherein the viologen moiety is present in the backbone of the polymeric viologen salt (Claim 13) such as viologen dihalide (Claim 16) or as a side chain of the polymeric viologen salt (Claim 14).

Inata et al teach that it is well known in the art that a polymeric viologen salt such as viologen dihalide (See column 1, lines 44-59) is more industrially applicable because it has longer repetition life (See column 1, lines 18-28) having the viologen moiety either in the backbone of the polymeric viologen salt (See column 2, lines 1-13) or as a side chain of the polymeric viologen salt (See column 1, lines 42-62).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used a polymeric viologen salt having the viologen moiety either in the backbone of the polymeric viologen salt or as a side chain of the polymeric viologen salt as an viologen acceptor in Mikhael et al in view Kato et al with the expectation of providing the desired long repetition life, as taught by Inata et al.

13. **Claims 12-16** are rejected under 35 U.S.C. 103(a) as being unpatentable over Afzali-Ardakani et al (US 5,776,370) in view of Kato et al (US 4,875,762), further in view of IBM Technical Disclosure Bulletin (1979), further in view of Inata et al (US 5,068,062).

Afzali-Ardakani et al in view of Kato et al in view of IBM Technical Disclosure Bulletin, as applied above, fail to teach that viologen salt is a polymeric viologen salt (Claim 12) wherein the viologen moiety is present in the backbone of the polymeric viologen salt (Claim 13) such as viologen dihalide (Claim 16) or as a side chain of the polymeric viologen salt (Claim 14).

Inata et al teach that it is well known in the art that a polymeric viologen salt such as viologen dihalide (See column 1, lines 44-59) is more industrially applicable because it has longer

repetition life (See column 1, lines 18-28) having the viologen moiety either in the backbone of the polymeric viologen salt (See column 2, lines 1-13) or as a side chain of the polymeric viologen salt (See column 1, lines 42-62).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used a polymeric viologen salt having the viologen moiety either in the backbone of the polymeric viologen salt or as a side chain of the polymeric viologen salt as an viologen acceptor in Afzali-Ardakani et al in view of Kato et al in view of IBM Technical Disclosure Bulletin with the expectation of providing the desired long repetition life, as taught by Inata et al.

14. **Claims 19, 35** are rejected under 35 U.S.C. 103(a) as being unpatentable over Afzali-Ardakani et al (US 5,776,370) in view of Kato et al (US 4,875,762), further in view of IBM Technical Disclosure Bulletin (1979), and further in view of Rembaum (US 3,754,055) and Spence (US 6,083,355).

Afzali-Ardakani et al in view of Kato et al in view of IBM Technical Disclosure Bulletin, as applied above, fail to teach that: (i) the substrate is of low density polyethylene (LDPE);

(ii) the method is conducted at a temperature 0-80⁰C in the presence of air and in the absence of any solvent; (iii) viologen salt bearing substrate is formed by providing vinyl alkyl halide grafted substrate; and forming a viologen salt on the vinyl alkyl halide or vinyl benzyl halide grafted substrate via a reaction with 4,4' bipyridine and subsequently with alkyl halide.

As to (i), Spence teaches that it is well known in the art that LDPE is suitable to use with CTCs for various purposes (See column 6, lines 33, 43-44).

It is held that the selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in Sinclair & Carroll Co. v. Interchemical

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Corp., 325 U.S. 327, 65 USPQ 297 (1945). See also *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960) (selection of a known plastic to make a container of a type made of plastics prior to the invention was held to be obvious); *Ryco, Inc. v. Ag-Bag Corp.*, 857 F.2d 1418, 8 USPQ2d 1323 (Fed. Cir. 1988).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used LDPE as a substrate in Afzali-Ardakani et al in view of Kato et al in view of IBM Technical Disclosure Bulletin depending of intended use of the final product since Spence teaches that it is well known in the art that LDPE is suitable to use with CTCs for various purposes.

As to (ii), Rembaum teaches that grafting a quarternized *pyridine* onto a substrate can be easily performed by first quarternizing vinyl pyridine via reaction with alkyl halide, then grafting resulting quarternized vinyl *pyridine* onto the substrate utilizing gamma radiation at a temperature 0-80⁰C in the presence of air and in the absence of any solvent (See column 2, lines 10-17, 62-69; column 3, lines 1-50). Spence teaches that it is well known in the art that gamma radiation is functionally equivalent to UV, plasma, etc. for grafting vinyl containing components onto substrates since grafting is normally initiated by the presence of peroxides or peroxy radicals that have been generated on the polymer surface via plasma, UV, or gamma-ray exposure with the monomer applied in a gas or liquid phase, as evidenced by Spence (See column 24, lines 6-12). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used UV radiation instead of gamma radiation in Rembaum for grafting quarternized vinyl pyridine vinyl onto a substrate since it is well known in the art that gamma radiation is functionally equivalent to UV, plasma.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have attached a viologen salt onto a polyaniline film of Afzali-Ardakani et al in view of Kato et al in view of IBM Technical Disclosure Bulletin utilizing a vinyl containing viologen salt and UV radiation at a temperature 0-80⁰C in the presence of air and in the absence of any solvent since Rembaum teaches that grafting a quarternized *pyridine* onto a substrate can be easily performed by first quarternizing vinyl pyridine via reaction with alkyl halide, then grafting resulting quarternized vinyl *pyridine* onto the substrate utilizing gamma radiation at a temperature 0-80⁰C in the presence of air and in the absence of any solvent.

As to (iii), the Examiner takes a position that the recited steps represent well known conventional methods of organic synthesis, i.e., grafting chloromethyl functional groups on a suitable polymeric substrate using vinyl alkyl (benzyl) chloride utilizing radiation or plasma is well known and conventionally used in the art, as well as reacting the chloromethyl functional groups with tertiary nitrogen containing compound such as pyridine to produce a grafted quarternized pyridine on the polymeric substrate, and quarternizing a grafted tertiary nitrogen containing compound by reacting with alkyl halide.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have formed viologen salt bearing substrate using claimed steps since claimed steps represent well known conventional methods of organic synthesis.

15. **Claim 34** is rejected under 35 U.S.C. 103(a) as being unpatentable over Afzali-Ardakani et al (US 5,776,370) in view of Kato et al (US 4,875,762), further in view of IBM Technical Disclosure Bulletin (1979), and further in view of Spence (US 6,083,355) and Allemand et al (US 5,729,379).

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Afzali-Ardakani et al further teaches that polyaniline can be deposited on (any) substrate (See Afzali-Ardakani et al, column 4, lines 27-28). However, Afzali-Ardakani et al/ in view of Kato et al in view of IBM Technical Disclosure Bulletin, fail to teach that the substrate is of low density polyethylene (LDPE).

Spence teaches that it is well known in the art that LDPE is suitable to use with CTCs for various purposes (See column 6, lines 33, 43-44).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used LDPE as a substrate in Afzali-Ardakani et al in view of Kato et al in view of IBM Technical Disclosure Bulletin depending of intended use of the final product since Spence teaches that it is well known in the art that LDPE is suitable to use with CTCs for various purposes.

Afzali-Ardakani et al in view of Kato et al in view of IBM Technical Disclosure Bulletin also fails to teach that: (i) polyaniline is formed on the substrate in situ by immersing the LDPE substrate into the solution of aniline and ammonium sulfate to form a polyaniline coated substrate; (ii) irradiating the coated substrate with UV in the presence of vinyl alkyl halide or vinyl benzyl halide to form a vinyl alkyl halide or vinyl benzyl halide substrate; and (iii) forming a viologen salt on the vinyl alkyl halide or vinyl benzyl halide grafted substrate via a reaction with 4,4' bipyridine and alkyl halide.

As to (i), Allemand et al teach that polyaniline can be formed on a substrate in situ by immersing the substrate into the solution of aniline and ammonium sulfate (See column 13, lines 1-5).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have formed a coating of polyaniline in situ on a substrate of Afzali-Ardakani et al in

view of Kato et al in view of IBM Technical Disclosure Bulletin using a method well known in the art comprising immersing a substrate into a solution of aniline and ammonium sulfate with the expectation of providing the desired polyaniline coated substrate, as taught by Allemand et al.

As to steps (ii), (iii), the Examiner takes a position that the recited steps (i)-(iii) represent well known conventional methods of organic synthesis, i.e., grafting chloromethyl functional groups on a suitable polymeric substrate using vinyl alkyl (benzyl) chloride utilizing radiation or plasma is well known and conventionally used in the art, as well as reacting the chloromethyl functional groups with tertiary nitrogen containing compound such as pyridine to produce a grafted quarternized pyridine on the polymeric substrate, and quarternizing a grafted tertiary nitrogen containing compound by reacting with alkyl halide.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have formed polyaniline/viologen salt CTC using claimed steps (i)-(iii) for depositing polyaniline in situ on a suitable substrate including claimed LDPE followed by attaching the viologen salt on the deposited polyaniline viologen salt bearing substrate using claimed steps since claimed steps (i)-(iii) represent well known conventional methods of organic synthesis.

16. **Claims 36, 37** are rejected under 35 U.S.C. 103(a) as being unpatentable over Afzali-Ardakani et al (US 5,776,370) in view of Kato et al (US 4,875,762), further in view of IBM Technical Disclosure Bulletin (1979), further in view of Beratan et al (US 5,016,063) and further in view of Pohl et al (US 4,455,233) and Rembaum (US 3,754,055).

Afzali-Ardakani et al in view of Kato et al in view of IBM Technical Disclosure Bulletin in view of Beratan et al fails to teach that the viologen salt is deposited on a suitable substrate by (i) grafting vinyl benzyl chloride groups on a substrate using vinyl benzyl chloride, and (ii)

reacting the vinyl benzyl chloride groups an equimolar mixture of 4,4' bipyridine and p-xylene dihalide.

As to (i), Pohl et al teach that pendant vinyl benzyl chloride groups can be easily grafted onto a substrate by irradiation the substrate in a solution of vinyl benzyl chloride (See column 8, lines 5-15).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have grafted vinyl benzyl chloride groups in Afzali-Ardakani et al in view of Kato et al in view of IBM Technical Disclosure Bulletin in view of Beratan et al by using substrate other than phenyl-containing substrate by irradiation the substrate in a solution of vinyl benzyl chloride since Pohl et al teach that pendant vinyl benzyl chloride groups can be easily grafted onto a substrate other than phenyl-containing substrate by irradiation the substrate in a solution of vinyl benzyl chloride.

As to (ii), Rembaum, as applied above, further teaches that pyridine reacts with aralkylene dihalide by simple mixing (See column 2, lines 10-17). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used an equimolar mixture of 4,4' bipyridine and aralkyl dihalide instead of forming a dipyridyl mono aralkyl halide compound in Afzali-Ardakani et al in view of Kato et al in view of IBM Technical Disclosure Bulletin in view of Beratan et al with the expectation of providing the desired viologen salt-grafted substrate since Rembaum teaches that pyridine reacts with aralkylene dihalide by simple mixing.

Allowable Subject Matter

17. Claim 38 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and

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any intervening claims. The following is an examiner's statement of reasons for allowance: Claim is allowed because the prior art of the record does not teach or suggest forming a polymeric material on viologen coated substrate in situ.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Response to Arguments

18. Applicant's arguments with respect to claims 1-19, 34-38 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

19. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Elena Tsoy whose telephone number is (571) 272-1429. The examiner can normally be reached on Mo-Thur. 9:00-7:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shrive Beck can be reached on (571) 272-1415. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

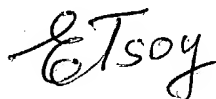
Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR

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system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read 'ETsoy', with a stylized, cursive script.

Elena Tsoy
Examiner
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April 21, 2004